

Serial No. 09/587,074

REMARKS

This amendment is responsive to the Final Rejection dated April 9, 2003.

Claims 1 - 43 were previously canceled.

Claims 44 - 79 are currently pending in the application.

CLAIM REJECTIONS- 35 USC §112:

Claims 45-48, 50-52, 55, 58-61, 65, 68, 70-79 were rejected under 35 USC §112, first paragraph as containing subject matter not described in the specification. In particular, the Examiner refers to the use of the term "re-phase layer" in the claims.

The Applicant respectfully traverses this rejection.

In fact, the re-phase layer and its function are described, in detail, in several places in the original specification of this application. The re-phase layer just was not referred to by the specific name "re-phase layer". To clarify the purpose of the layer and its reference back to appropriate explanation in the specification, the Applicant has amended several paragraphs of the specification to identify the re-phase layer. No new subject matter has been added. The changes were made for consistent reference to the same layer.

The re-phase layer is found in the original specification in Figure 4a & Figure 5 and is labeled as layer 36. It is first described in the text on page 10, lines 7-11, referring to Figure 4a, "In an exemplary VCSEL embodiment in accordance with the present invention, a first layer 36 of the dielectric mirror 34 is preferably not a multiple of a one-quarter wavelength. Rather the thickness of the first dielectric mirror layer 36 is preferably adjusted to compensate for the semiconductor anti-phase layer, ensuring that the dielectric mirror 34 is in-phase with the semiconductor mirror." In other words, layer 36 "re-phases" the dielectric mirror with the underlying semiconductor mirror. This paragraph has been amended to appropriately refer to the layer as a re-phase layer.

The function of the layer is again described on page 11, lines 10-15 and lines 19-21, where it is referred to as a "phase matching layer" and a "spacer layer". These descriptions show that the applicants knew very well the function and the characteristics of the layer, but just did not apply an adequate name for it, since the names phase matching layer and spacer layer could also mean something else.

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Thereafter, the layer 36 is again described in detail, in reference to Figure 5, on page 13, lines 24-33. There explicit mention is made of the fact that the optical thickness of the layer 36 should be such that the sum of its optical thickness and that of the anti-phase layer should be "an integral number of half wavelengths" (lines 31-32).

Finally, there are detailed discussions in the specification of a more complicated "re-phase layer", designated as layer 72 in figures 11-12, and usually referred to as a spacer layer. This section of the specification, beginning on page 15, explains how the "re-phase layer" is formed to give a varied "re-phasing" that results in index guiding. That forms the basis for the claims 69-77. Note again that all the important points are made in this section of the specification. Only the term re-phase was not used at the time.

Entry of the amendments and withdrawal of the rejection is respectfully solicited.

CLAIM REJECTIONS - 35 USC §102

Claims 44, 54, 57, and 66 were rejected under 35 USC §102 as being anticipated by Shin '941.

Applicant respectfully traverses on the grounds that Shin does not disclose an anti-phase layer as stated. In fact, in Shin et al (5,753,941) in figure 2, layer 42 is a metallic annular reflector and layer 44 is a high conductivity metallic contact. There is no mention in Shin et al (5,753,941) of an anti-phase layer or of any understanding of the need for one.

Note that Figure 2 is described in detail, in the specification section of Shin et al (5,753,941), from line 39, column 2 through line 39, column 3. There it states (column 3, lines 5-24), "The electrode layer 40 is formed with a cavity 46 for emitting light transmitted from the second reflector layer 36. The electrode layer 40 is a double layer of a metal layer 44 and a conductive auxiliary reflector layer 42. The metal layer 44 is connected to the external power source and preferably formed of metal having a high electrical conductivity such as gold or silver. Between the metal layer 44 and second reflector layer 36, the auxiliary reflector layer 42 is formed of nickel, molybdenum, platinum or chromium. The reflectivity of the auxiliary reflector layer 42 is approximately 98-99%, which is lower than those of the first and second reflector layers 32 and 36. Therefore, the intensity of the light reflected from the lower surface of a protruding portion 43 of the auxiliary reflector layer 42 is smaller than

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that of the light reflected from the cavity 46. Thus, the auxiliary reflector layer 42 suppresses the emission of light of high-degree modes and thus serves to emit low-noise light of a single mode via the cavity 46."

The description of the reflector layer 36, found in column 2, lines 56-67, in Shin et al (5,753,941), also does not mention an anti-phase layer or any understanding of the need for one.

Thus, Shin et al (5,753,941) does not appear to even recognize that the reflections from layer 36 and from layer 42, in the protruding portion 43, will interfere either constructively or destructively. By placing layer 42 directly on layer 36, without an anti-phase layer as described in our application, they can, at best, obtain only slight destructive interference at the lasing wavelength. Thus their mode selectivity will be vastly inferior to that of claimed device. This point was discussed in great detail in the previous response and in the specification itself. The most important detail is that very high destructive interference, for high mode selectivity, occurs over a very narrow wavelength range and that wavelength range is centered on the lasing wavelength by the correct choice of the thickness of the anti-phase layer.

CONCLUSIONS:

Accordingly, it is submitted that claims 44-79 define subject matter that is patentably distinguishable over the cited art of record.

Claims 44-79 are thus believed to be in condition for allowance and the application ready for issue.

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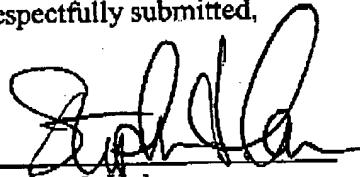
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Corresponding action is respectfully solicited.

PTO is authorized to charge any additional fees incurred as a result of the filing hereof or credit any overpayment to our account #02-0900.

Respectfully submitted,



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